

Changing the Battlefield by Remote Control, are Pilots a Thing of the Past?

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Changing the Battlefield by Remote Control, are Pilots a Thing of the Past?

A Paper for Expeditionary Warfare School

by

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“ Surveillance by UAVs has been going on for decades, and both the Israelis and the Americans occasionally employed UAVs for real-time target acquisition. What made VMU-1 and similar units in Iraq different in 2004 was that acquisition became routine at the lowest tactical level. The insurgents had no place to hide. When they came out of doors, they were see, tracked and attacked-day after day since May...”(Bing West)

When it was invented, the aircraft threatened the very existence of long established military organizations.¹ It was a technology that completely changed the way that war was waged as well as the way that forces organized to fight them. Now, a developing technology seems on the verge of causing another such upheaval in the way that we approach war. “The Joint Strike Fighter has been hailed as the last manned fighter.”² The debate about whether or not human pilots will eventually become a thing of the past has been going on for decades, but the effectiveness of Unmanned Aerial Vehicles(UAVs) in the current operational environment has heightened the discussion. In combat actions in Iraq and Afghanistan UAVs are a force multiplier, they save lives. UAVs are being employed on every level of the battlespace, strategic, operational and tactical, but does that mean that they are better than human piloted aircraft? The utility and efficiency of these systems has highlighted the debate over whether they will eventually replace human pilots and the aircraft designed around them. UAVs offer numerous advantages, in the design, cost, safety, and performance. They still cannot think however, or provide the intangible advantages that a human pilot brings, such as intuition, morality, decision-making ability and judgment. A look at the capabilities and future capabilities of UAVs and the advantages and disadvantages of the UAV versus the human pilot will offer some insight as to the future of combat aircraft.

The UAV was first contemplated in WWI and has been used in various wars since. The V2 rockets that were used by the Germans in WWII were UAVs. In 1982 the Israelis used UAVs to deceive and destroy the Syrian integrated air defense system. Recently,

¹ Nolan, p.V

² Dinkin p. 1

UAVs are mostly being used as a reconnaissance tool, but advances have greatly expanded their capabilities on the battlefield, to the advantage of the warfighter. Currently there are thirty-three UAV systems deployed in operational units being used for target acquisition, forward air control, airborne (FAC(A), aerial retransmission of radio nets and lasing and in some cases engaging targets.³ Of the six roles of Marine Aviation, UAVs can now perform four. UAVS have evolved from being a useful but limited tool to becoming a critical part of the battlefield. UAVs can not only perform roles that pilots could, they are performing missions that no air-breathing aircraft could, and in the process changing the way that we conduct warfare. According to the 2005 UAV Roadmap, “Of the 50 capability gaps specified in the FY06-11 Initial Priority List(IPL)s, 27(54 percent) are capabilities that are currently, or potentially could be, addressed by(UAVS). Four of the 27 shortfalls specifically identified unmanned platforms as the desired solution.”⁴ UAVs are classified according to size and in general their size corresponds to what level they operate on the battlefield, from micro UAVs up to huge Unmanned Airships that will loiter in near space for months at a time.

What are the compelling advantages do Unmanned Vehicles bring that are enough to question the need for human pilots and the institutions that support them? They are design, cost, safety, and performance. One of the major disadvantages that a human being places on the design of an aircraft is that it must not only perform its mission, it must also have an interface with the human pilot as well as contain systems to protect him and provide him with oxygen, heat and space to operate. These things add a significant

³ UAS Roadmap

⁴ UAS Roadmap p.41

expense to the price of development. It is estimated that the 30% of the development of the F-22 fighter is invested in the pilot.⁵ UAVs also realize a cost savings because they do not incur the cost of training the pilot, which is estimated at upwards of two million Dollars per pilot.⁶ Pilots also currently receive monetary incentives and bonuses that would no longer be needed. The absence of the pilot also means that the vehicle is designed around purely the mission, which gives many advantages in performance. One advantage is that the performance of the system is not limited by the vulnerabilities of the pilot's body to things like gravitational forces. Currently the ability of an aircraft to maneuver is limited by the gravitational loads that the pilot can endure. Without the pilot, the aircraft is only limited by the materials and construction of the aircraft. Another limiting factor from the human pilot is that of fatigue. The UAV can be refueled and refitted and returned to duty. The limitation is one of maintenance, not fatigue. Performance is further enhanced by the lack of weight that is used in the support of the pilot, his controls, seat, canopy, and life support. All aspects of vehicle performance such as fuel efficiency, payload, speed and maneuverability are enhanced by the reduction of weight. Also the loss of the apparatus that supports the pilot means that the aircraft can then be made smaller which reduces the detectable signature of the UAV⁷, making it stealthier and more survivable. The biggest advantage of the UAV, however is they save lives.⁸ They save lives during development because they do not require test pilots and they reduce the risk of losing a human pilot during combat missions. Pilots that are shot down mean a huge effort in men and equipment to recover them or their remains, and can

⁵ Nolan p.8

⁶ UAS Roadmap

⁷ Nolan p.9

⁸ Nolan p.10

become a strategic disaster if the enemy captures the pilot. The Scott O'Grady case became an international event after he was shot down over Bosnia and eluded capture. Another case in point was the capture of Francis Gary Powers after his U2 was shot down over the Soviet Union. Until the Soviets produced a pilot, president Eisenhower announced to the world that the US had lost a NASA high altitude research craft and it's pilot. Khrushchev who then produced the live pilot and exposed the first evidence that the US was actively spying on the Soviet Union then publicly embarrassed Eisenhower.⁹ This caused an immediate souring of relations between the US and the Soviet Union.

The gain in lower costs, performance and risk is evident but there are also disadvantages which have to do with the control of the vehicle. There are two ways to remotely control a UAV: by remote control with a human operator, or to make the vehicle autonomous. Both present problems now, though the problems will likely be mitigated in the future. The first type, the remotely operated UAV has two inherent problems, the first being that the control input relies on a communications link which is vulnerable and the information that the operator receives in the way of feedback is severely limited by the sensors that onboard. The communication link must have sufficient range and bandwidth to both provide control inputs and commands and provide feedback to the operator and the information that the UAV may be collecting and sending home. Currently the only way to provide this is through satellite communications, through which an operator in Colorado can control a Predator in Iraq.¹⁰ The problem in a non-permissive environment is that the frequencies that are used are vulnerable to interference, jamming, or possibly being taken over. Also the satellites that are currently

⁹ Nolan p.8

¹⁰ West p.264-265

being used have a limited capacity, which means that a limited number of UAVs can be used at the same time. The other problem is feedback, which means that the pilot must rely on instruments and usually video feeds to control the aircraft. This is a big reduction in the data available to the human pilot who receives information by seeing, and feeling the feedback from the controls and the aircraft itself.

Even though the advantages and disadvantages of the UAV are for the most part technical, it is in the non-technical area that the human pilot exceeds the capabilities of the UAV at least for the foreseeable future. The current technology is far away from any “thinking” capability and even further from judgment and reason approaching that of an intuitive, motivated, and experienced human being. UAVs cannot apply doctrinal principles, initiative or intuition. A pilot can use his situational awareness, experience, and use the principle of intent to make quick decisions on the battlefield. We accept that “friction” and the “Fog of War” are inherent to the battlefield, it is doubtful that a machine could possess the ability to cope with friction; it would have to rely on the responses that it is programmed with for specific conditions. It is flexibility and adaptability that are the human pilot’s biggest assets.¹¹ War is a contest between active, creative, unpredictable wills and it is the will of the pilot that is needed to oppose the will of the enemy. Finally, there is a moral advantage that a machine can never compete with, the pilot’s moral judgment and connection to the human beings that he is supporting, transporting, and defending. In today’s operating environment the pilot has many restrictions on him concerning who, where and how to engage the enemy. Combat often takes place in populated areas like cities and built up areas. These environments offer

¹¹ Nolan

many dilemmas such as whether or not the risk of collateral damage is acceptable, or damage to culturally valuable structures. That is a tough decision for a human much less a machine. Last, there is the bond of trust between the troops on the ground and the pilot in the sky supporting them. There is a certain amount of trust in that pilot from the troops, especially in roles like close air support where they may be engaging targets very close to troops on the ground. It is doubtful that ground troops would ever be as comfortable with a machine as they would be a person who they have trained with, shared the same briefings with and have experienced the same environment.

It is evident that Unmanned Aerial Vehicles have a lot to offer on the modern battlefield, and that the capabilities that they will bring in the future will continue to increase at a rapid pace. They will fundamentally change the way that we conduct warfare in the future and that they will continue to outperform human beings. We must not let an attachment to current institutions and doctrine keep us from exploiting the capabilities that they bring. However the advantages of UAVs are technical ones, and even after technical solutions are found for their flaws they will never be able to completely replace human beings. War is a human endeavor, unpredictable, and chaotic and no machine can exploit that as well as human being. They may be able to wage war, and be a force multiplier but they will never be a warfighter. Pilots may have reduced or different roles in the future, but they will never go away.

BIBLIOGRAPHY

Dinkin, Sam. "Alighting the Pilot." 23 August 2004.

<www.thespacereview.com/article/211/1>

Johnson, Neil. "Turning the Unmanned Aerial Vehicle Into Commercial Products."

<www.ee.byu.edu/magicc/research/commercial>

Nolan II, Major Robert. "The Pilotless Air Force? A Look at Replacing Human Operators With Advanced Technology." March 1997. Research paper, Air Command and Staff College

Office of the Secretary of Defense. *Unmanned Aircraft Systems Roadmap 2005-2030*. Washington, DC. July 20 2005

West, Bing. *No True Glory*. New York, NY.: Bantam Dell, 2005.

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